POLITECNICO DI MILANO

PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 39th cycle

Research Area n. 1 - Computer Science and Engineering

PNRR 117 Research Field: TRAINING AND ADAPTATION OF DEEP LEARNING MODELS FOR BIOMEDICAL IMAGING AT LOW-DATA REGIMES

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Costs for obtaining annotated data in the biomedical field is a great hindrance when solving healthcare-related problems by powerful Machine Learning techniques. Ikonisys will sponsor a PhD scholarship to investigate the following research directions: - Design novel data augmentation techniques to work in low-data regimes for training models able to segment cells in microscopy images. - Design novel Computer Vision models able to assist professionals and partially automate the diagnosis process of specific diseases.
Methods and techniques that will be developed and used to carry out the research	The research will primarily focus on data augmentation methods in a generative framework (thus using GANs and Diffusion Models to create synthetic data). Moreover, the PhD. candidate will investigate deep detection and segmentation architectures for improving automated diagnosis on biomedical images.
Educational objectives	The PhD candidate will develop a strong background in biomedical image processing related to Deep Learning for supervised learning and data generation. The

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	collaboration with the industrial counterpart will enhance their engineering skills as well.
Job opportunities	AI, and deep learning models, find many applications in healthcare, ranging from drug discovery to the identification of rare diseases. A PhD graduate with skills related to this field is valuable to companies operating in the biomedical domain, which are developing high-tech analysis instruments, such as Ikonisys.
Composition of the research group	0 Full Professors 1 Associated Professors 2 Assistant Professors 7 PhD Students
Name of the research directors	Giacomo Boracchi

Contacts
giacomo.boracchi@polimi.it https://boracchi.faculty.polimi.it +39 02 2399 3467

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Ikonisys s.r.l
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Dalla Molle Institute for AI, Università della Svizzera Italiana (USI) Lugano (CH)
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

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EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student.

TEACHING ASSISTANTSHIP: availability of funding in recognition of supporting teaching activities by the PhD student There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

COMPUTER AVAILABILITY: individual use.

DESK AVAILABILITY: individual use.

Contacts to start collaborations with the following partners

- Dalla Molle Institute for AI, Università della Svizzera Italiana (USI) Lugano (CH)
- Tampere University, Tampere, Finlandia (FI)
- Masaryk University, Brno, Czechia (CZ)